emphasise the potential danger of this medication, especially in the elderly.

A 77-year-old man presented with alteration of bowel habit, rectal bleeding, and tenesmus. He was found to have a rectal carcinoma invading the prostate and underwent an abdominoperineal resection of the tumour. He developed urinary retention postoperatively and required intermittent catheterisation. After withdrawal of the catheter he was given 10 ml potassium citrate *BP* three times a day and co-trimoxazole for a urinary tract infection. On admission his serum creatinine was 161 μmol/l (1·8 mg/100 ml), blood urea nitrogen 9·7 mmol/l (13·6 mg/100 ml), and serum potassium 3·7 mmol(mEq)/l. One week later he became unwell with excessive shaking of his limbs and with a coarse hand tremor. His serum potassium level was found to be 7·0 mmol/l; an electrocardiogram showed elevated T-waves but was otherwise normal. He was on no other medications. His potassium citrate was discontinued and his symptoms stopped. The serum potassium level fell to 4·9 mmol/l over the ensuing three days.

This case illustrates that potassium citrate mixture is not a harmless preparation even when given in acceptable dosage to patients with normal renal function in a hospital setting. It should be emphasised that the medication contains 9·25 mmol of potassium ion per gram and that specific warnings are not given about the dangers of hyperkalaemia in either *Martindale's Extra Pharmacopoeia*[1] or in the *United States Dispensary*.[2] We feel that care should be exercised when this mixture is prescribed, especially in the elderly and in those patients with impaired renal function.

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Interaction of indomethacin and warfarin

SIR,—Dr Alex Paton, in his answer to the question concerning the use of antirheumatic drugs in patients receiving long-term anticoagulant therapy (21 November, p 1379), states that indomethacin potentiates the effect of warfarin.

There have, in fact, been a number of studies of concomitant administration of indomethacin and anticoagulants of the coumarin group showing no such interaction.[1-3] Vessell *et al*[3] carried out two double-blind, placebo-controlled studies in normal volunteers. In the first of these the prothrombin time was stabilised at one-and-a-half to two-and-a-half times normal on a constant dose of warfarin, and then regular indomethacin or placebo was introduced with no subsequent change in prothrombin time. In the second study they demonstrated no difference in prothrombin time or warfarin plasma half-life between an indomethacin group and a control group when a loading dose of warfarin was given. In their data sheet for indomethacin Thomas Morson Pharmaceuticals states that "controlled clinical studies have shown that Indocid did not influence the hypoprothrombinaemia produced by anticoagulants in patients and normal subjects." They do, however, recommend that the prothrombin time is observed closely when indomethacin is given to a patient receiving oral anticoagulants. Apart from individual interaction with warfarin there is, of course, always a danger that patients on non-steroidal anti-inflammatory drugs may develop gastrointestinal bleeding, and this is a further point to bear in mind before undertaking anticoagulation.

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[2] Muller G, Zollinger W. In: Heister R, Hofmann JF, eds. *International symposium on inflammation, Freiburg in Breisgau.* Munich: Urban and Schwarzenberg, 1966.
[3] Vesell ES, Passananti GT, Johnson AO. *J Clin Pharmacol* 1975;**15**:486-95.

Perforated duodenal ulcer after perioperative steroid treatment

SIR,—I refer to the recent article "Perforated duodenal ulcer after perioperative steroid treatment" by Mr J L Beynon and others (12 December, p 1591). The use of steroids in large doses has been routine in transplant surgery for many years, though there has been a recent tendency to lower doses. Patients waiting for transplant are screened preoperatively for evidence of peptic ulceration or hyperacidity, and appropriate therapy is started. All patients prophylactically have cimetidine administered to them. Since we started the use of cimetidine about two years ago, the incidence of overt peptic ulcer symptoms, and their complications, has been negligible. Initially we used cimetidine in a dosage of 200 mg three times a day and 400 mg at night, but we now tend to use 200 mg three times a day in the presence of good renal function. The patients who cannot take oral medication immediately following operation have parenteral cimetidine.

There is little doubt that patients undergoing any form of surgery are under acute stress and this, coupled with the ingestion of steroids, must make peptic ulceration almost inevitable. The use of enteric-coated tablets has failed to reduce the incidence of this problem, and we are convinced that cimetidine needs to be started preoperatively and continued until the steroid dosage is reduced.

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Assessment of iron stores in inflammation by assay of serum ferritin concentrations

SIR,—The paper by Dr D R Blake and others (31 October, p 1147) seeks to deal with the interpretation of serum ferritin concentrations in patients with inflammatory diseases. The reason for measuring serum ferritin is to single out those patients who would benefit from iron therapy by assessing the level of their iron stores. Excessive ferritin release from damaged tissues, particularly the liver, can make interpretation difficult but this is not usually a problem in inflammatory disease.[1]

The abstract of the paper by Dr Blake and his colleagues suggests that serum ferritin concentration may rise with storage iron levels but may also be directly influenced by the inflammatory process. This is at variance with the data and conclusions expressed in the main body of the paper. The changes in haemoglobin concentration which took place in the patients are given in only one case—a 22-year-old woman with classical rheumatoid arthritis. Her disease remitted spontaneously over the course of six months and during that time her haemoglobin concentration rose from 8 to 13 g/dl. This change alone would be expected to account for a decrease of the order of 100 μg/l serum ferritin,[2] and indeed the serum ferritin concentration fell from 55 μg/l to an unstated figure less than 15 μg/l. When she was anaemic she had normal levels of storage iron but when the disease remitted and the marrow again resumed its normal activity the demand for iron exhausted the stores. There is no evidence that the serum ferritin concentration did not simply reflect the level of iron stores at each given instant. Whether or not the level of storage iron indicated by the serum ferritin concentration is adequate for future demands is a separate issue.

In addition, this brief paper makes a number of remarkable statements. We are told that the haemoglobin concentration and "red cell variables" are a reliable index of iron stores in normal subjects. Iron stores in normal subjects range from 0 to over 2 g and are not known to be correlated with either haemoglobin concentration, mean cell volume, or any other red cell variable. The authors also state that the word ferritin, as in "serum ferritin," is a misnomer. This is not so. The term apoferritin is used specifically to describe the protein in its iron-free state. Serum ferritin may contain relatively little iron but it does contain detectable quantities[1] and is properly called ferritin. The fact that all serum ferritin assays are based on the detection of the ferritin protein rather than its iron does not affect its proper nomenclature.

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[1] Worwood M. In: Jacobs A, Worwood M, eds. *Iron in biochemistry and medicine.* Vol 2. London: Academic Press, 1980:203-44.
[2] Walters GO, Miller FM, Worwood M. *J Clin Pathol* 1973;**26**:770-2.

**We sent this letter to Dr Blake, who replies below.—ED, *BMJ*.

SIR,—The three points raised by Dr D P Bentley and others in their letter are valid, clinically important, and discussed in our paper.

The clinical questions we sought to answer were simple. What is an appropriate lower limit of normality for a serum ferritin estimation in a rheumatoid population and at what level of serum ferritin should we consider investigating the cause of the patient's iron deficiency? In a healthy population serum ferritin under 15 μg/l indicates low iron stores. Dr Worwood (their ref 1), referring to patients with infection, inflammation, and chronic disease, has stated that "a ferritin concentration in excess of 50 μg/l should rule out iron deficiency in such patients but further studies are needed to confirm the statement." Our study would confirm the statement as the figure derived from our data is 55 μg/l.